

The Organization and Operation of a Study of Diarrheal Disease in Fresno County

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SUMMARY

The procedures used in the organization and operation of a special study on diarrheal diseases involving federal, state, and local agencies are outlined. The integration of such a project into a local routine program is discussed and the possible benefits derived by the various agencies are briefly evaluated.

APPLIED epidemiologic research has been carried on for many years by the State Department of Public Health, metropolitan health departments, the universities, and the United States Public Health Service. However, such work by federal, state, and university groups has usually been independent in nature because of the requirements of specialized personnel, time, equipment, working space, etc., as well as the difficulty of fitting these projects into routine local programs. The purpose of this report is to illustrate how and to what extent, both from an administrative and from an operational standpoint, a special project was integrated into the Fresno County Health Department program.

PROJECT PROPOSAL

For a period of at least five years previous to this study the infant mortality rate from diarrhea and enteritis was consistently higher in San Joaquin Valley counties than in the state as a whole and programs were generally directed toward this problem by the local health departments.

In the fall of 1949, the incidence of diarrheal diseases among migratory workers' families reached a climax. It was difficult to know the exact numbers affected, but a general measure is that during the summer and fall the hospitals were crowded with very young children sick with this disease. Through the local health departments and hospitals, specific and more detailed information became available which demonstrated the magnitude of the problem in morbidity and mortality, particularly among the infants.

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The work here reported was a joint project of Fresno County Health Department, California State Department of Public Health, and the Federal Security Agency, Public Health Service, National Institutes of Health, Diarrheal Disease Control Service.

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When the urgency of the situation became apparent, various conferences were called, federal, state, and local agencies participating. Discussions were held not only on general health matters, but also on sanitary facilities, housing, nutrition, the fly problem, and related subjects. The need for a basic epidemiologic study of the diarrheal diseases in the Central Valley was recognized as fundamental from the recommendations proposed. As part of such a study, surveys on the domestic fly population would be included because flies are considered one of the problems in the transmission of these diseases.

Since the focus of the diarrheal diseases was located in the San Joaquin Valley, the first study was planned for that area. However, because of the magnitude of the problem, and, because this was to be a pilot study, the area surveyed was of necessity limited. Fresno County was selected, as it fulfilled the major requirements for such an investigation. There were available adequate sampling populations in migratory labor camps, in low socio-economic groups, and in substandard housing; the county was centrally located and was representative of the San Joaquin Valley.

The project was planned as a cooperative effort by the United States Public Health Service, the State Department of Public Health, and the County of Fresno. Each agency contributed personnel, facilities, and financial support in varying combinations. By joint agreement, Dr. James Watt* of the United States Public Health Service was appointed project head and the staff was organized under his direction. The plan was to operate the field survey for a period of six months (July-December 1950).

For convenience, the investigation was divided into two phases, the human epidemiologic study, and the fly population study.

The main objectives of the human study were:

1. To determine the incidence of diarrheal diseases in general population groups by using the method of single or repeated family unit histories in a selected sample.

2. To determine the prevalence of the most common etiologic agents causing diarrheal diseases—Shigella and Salmonella micro-organisms—by the method of obtaining rectal swab cultures on all children ten years of age and under in general population groups, without reference to clinical illness.

The main objective of the fly study was to determine, if possible, whether a correlation existed between the incidence of diarrheal diseases and the domestic fly population. Evaluation of the fly popu-

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lation was accomplished by taking grill counts of sample blocks to establish a population index, and by the use of the fly trap to determine the type of flies in the selected study areas.

A combined objective of the two phases was to plan and design an environmental sanitation survey form to effectively evaluate the sanitation as it might apply to the epidemiologic factors of diarrheal diseases and the production of flies.

ROLE OF THE LOCAL HEALTH DEPARTMENT

The Fresno County Health Department assisted in developing the specific project proposal as outlined. At first, it seemed an overwhelming task with a shortage of personnel, of funds, and of working space. However, with continued group discussions of the various interested agencies, the plans developed and the project began to unfold as a tangible working organization. The program was presented and explained to the Fresno County Board of Supervisors,[†] who consented to assume sponsorship. The special study became known as the Diarrheal Disease Project of the Fresno County Health Department. All financial transactions relative to the study were conducted by the county.

Following these preliminary steps, two storage rooms in the basement of the local health department building were converted into a field station. Some equipment was provided locally, and some obtained from the State Department of Public Health. The rest was purchased out of the special fund. Full-time personnel for the unit consisted of civil service employees from federal, state and county agencies, and temporary employees hired only for the project. The temporary employees were cleared through the county civil service, and emergency ratings with new titles were set up in specific cases. The services of other regular county employees—such as public health nurses, bacteriologists, and sanitarians—were contributed as time permitted from their routine duties. The utilization of local personnel on a study of this kind—applied epidemiologic research—as usually conducted by either federal or state agencies, is a definite departure in California.

The operation of the project, assisted by federal and state plans and personnel, was integrated into the County Health Department program in every possible way. The County Health Officer was consulted on all matters of local policy and he served as liaison between the head of the project and the board of supervisors. The public health nurses' assistance to the study cannot be overemphasized. First, in the survey work, they became part of the field team. In addition, each public health nurse selected a group of interested citizens in some one locality (town, housing project, or camp) in her district and developed them into a voluntary working unit. Such community health committees were an organization mechanism which had been used

successfully in other public programs in Fresno County. They helped the public health nurse to carry out her part in the Special Diarrheal Disease Project. (It was planned that these committees would, in addition, be part of the local health department's long-range program to develop citizen awareness of problems and citizen participation in solving these problems.) Just as the individual public health nurses became part of the field team, so did the members of the community health committees under their guidance. In other words, extra personnel was provided and used effectively in a number of instances; undoubtedly, many more locations were surveyed because of this citizen participation.

To further integrate the activities into the local program, field visits were scheduled as far as possible to coincide with local health department functions. For example, immunization clinics were utilized whenever feasible—the public health nurse and the field team synchronizing the two operations to the best advantage. Child health conferences were routinely visited, and medical members of the Special Project worked with the public health nurses in obtaining rectal swab cultures from the children and family histories on those attending the conference.

A description of the scope of the survey operations will indicate to some extent the physical effort and work involved and the process of integration used in this investigation. The two phases of the epidemiologic study paralleled each other as far as was practical, although they were operated separately.

The human study included four types of population groups of various socio-economic levels. Briefly, these may be described as follows:

1. The child health conference groups were well-baby clinics, and partially represented a cross-section of the population of the town in which they were held. Thirteen of the 17 organized conferences were visited from one to three times each during the six-month period.

2. Housing project occupants, were population groups living in government housing facilities. These were located in urban and suburban areas. The incomes of these people varied considerably, but the housing was quite modern and the units fairly comparable one to another.

3. "Fringe" areas of towns selected were suburban areas adjacent to city limits, having rural facilities such as well-water, privies, and sub-standard housing.

4. Labor camps were cabins, tents, or trailer space furnished by the farm owner and used for the housing of farm labor during the crop season.

These four population groups were from widely separated representative areas of Fresno County, including urban, suburban, and rural. The field teams travelled an average of 2,000 to 3,000 miles each month in carrying out the surveys in these scattered locations.

According to the primary objectives of the human study, family histories were to be obtained to determine the incidence of diarrheal disease. Single his-

[†]The City of Fresno contracts with Fresno County for Health Department services.

tories were taken on approximately 2,000 family units. In several selected areas, history-taking was repeated monthly to observe the seasonal trend; this represented approximately another 2,000 histories. Public health nurses and community health committees assisted in taking many of these histories. It is impossible to estimate the number of home visits required to carry out this objective because many additional visits were necessary to find the parents at home. Also, extra visits were made when information was incomplete.

The second main objective was to determine the prevalence of *Shigella* and *Salmonella* microorganisms. A total of 7,065 rectal swabs from children under 10 years of age were collected. Again, the public health nurse and her committee were of definite assistance. Because they were known in the community, many times they paved the way for admission into the home. Also, as an employee of the local health department, the public health nurse could act as liaison for the field team, and in many instances made the preliminary arrangements in the community or camp for the survey.

The division of laboratories of the Fresno County Health Department became an important adjunct to the laboratory phase of the project. The staff assisted in setting up the physical arrangements in the field laboratory and supervised the installation of certain equipment, and throughout the survey accepted the responsibility of its maintenance. The laboratory division further cooperated with the Special Project by screening all organisms isolated by the field laboratory which were suspected of belonging to the genus *Shigella* or *Salmonella*. Approximately 900 cultures were screened by biochemical and agglutination tests during the period of operation. The final definitive typing of the organisms was done at the State Division of Laboratories.

The scope of the domestic fly study included the evaluation of the fly population in three of the four economic divisions of the human study — housing projects, "fringe" areas of towns, and labor camps. Each area was sampled once a week from June to October, and thus a weekly fly population index was established for that period. The sanitarians of the Fresno County Health Department were most helpful in assisting the field team in setting up fly sampling areas; they also cooperated in developing the survey form used to evaluate objectively the existing sanitation in the labor camps.

The coordinating mechanism utilized in the Special Project included staff and general meetings, progress reports, and consultative service. Each week, the head of the Special Project attended the public health nurses' staff meeting. Plans and problems of the project as they related to this group were presented and discussed, and the schedule for survey activities for the following week was outlined. Any suggestions or changes for survey areas were made by the public health nurses at this time. Consultative service was given by the head of the

project to the public health nurses in developing the community health committees. In fact, he and other members of his staff attended meetings and helped to interest the citizen groups in the formation and function of these community committees. Another means of further coordination was to keep all agencies currently informed on the survey activities. At the nurses' staff meetings, verbal progress reports were made. In addition, a written monthly report was submitted and each agency received a copy.

Consultative service was given to the chief sanitarian and his staff, and at group conferences basic sanitation as a control measure for diarrheal diseases was stressed repeatedly. Also discussed was the development of a sanitary survey code which might be applicable not only in the present investigation, but also for the long-range health department program in this field. In-service training was furnished by the group conducting the fly study; the sanitarians were given field training in the techniques used by the entomologic field team.

Meetings were held with the board of supervisors, the Interagency Committee,* and the San Joaquin Valley Health Officers' Association. These groups were apprised of the situation and of the progress of the investigation, and were informed regarding possible control measures. For general interest, some publicity on the operation of the project was released to the citizens of Fresno County through their newspapers and the radio.

EVALUATION

There is no doubt that each agency involved profited from the coordinated effort required to organize and operate the Diarrheal Disease Project. The exact benefits derived are difficult to evaluate, but appear to be twofold: First, the immediate gain of working as an integrated group of three agencies; second, the potential long-range effect on the general program of the local health department resulting from the multiple underlying factors of the specific diarrheal disease problem.

With regard to the immediate benefits referred to, state and federal agencies now have a greater appreciation of the possibilities of utilizing local health department personnel and facilities in their special area investigations. On the other hand, local health authorities should realize that applied epidemiologic research can be fitted into their routine programs. Each group expressed a feeling of satisfaction from this experience.

The immediate benefits which were gained during the operation of this Special Project were worthwhile, but of far greater importance are the potential long-range results which may develop. It is hoped that in the future, state and federal agencies will plan similar cooperative studies more or less following the pattern outlined in this report.

*The Interagency Committee is composed of: Fresno County Chapter of the American Red Cross, Agricultural Extension Service, County School Department, Fresno County Coordinating Council, Fresno General Hospital, Missionary agencies, Fresno County Tuberculosis Association, Central Valley Empire Association, and State Department of Employment.

At the local level, the health department has promulgated a program of continuous in-service training for the field staff, that they may better meet the needs of the agricultural workers. The community committees have been encouraged to help solve their own health problems. A number of the larger agricultural growers in Fresno County have been included in the work of these committees. Field conferences have been held with the growers and as their understanding of the problems increases, so in turn will the resources for the agricultural camps develop. Already, it has seemed necessary to provide health centers and classroom facilities in each of the larger camps. (Four of the ranch owners are now preparing such centers.) However, much more work

is necessary at the local or community level, more contacts, continued interest, a better understanding for all groups involved, and an expanded educational program.

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Note: The statistical results of the Special Study are incomplete at this time, but will be reported in detail later.

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Crushed Ice Packing in the Treatment of Burns

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APPPLICATION of packs of crushed ice to damaged areas in the treatment of severely burned patients has many advantages medically, and in addition it is a method adaptable to administration by trained lay personnel if that should become necessary in the event of atomic attack or other such catastrophe.

The treatment was used as an emergency measure aboard a Navy vessel in wartime after supplies needed for conventional methods had been exhausted. Fifty patients were extensively burned in gasoline and other explosions during enemy attack. With materials on hand at the outset, standard methods were employed to overcome shock, relieve pain and prevent dehydration. Each patient was given frequent 0.03 gm. doses of morphine sulfate, oxygen by nasal catheter, and infusion of at least a pint of plasma per day. Normal saline solution and saline solution with 5 per cent glucose were given intravenously as indicated. The burned areas were wrapped in pressure bandages of vaseline gauze.

For the first two or three days after injury the patients appeared to do well, but in many cases pulmonary edema developed on the fourth day. In such instances the extremities swelled and hacking cough and irrationality developed. Some of the patients died and others were in critical condition.

In all cases of major burns, the vein in which plasma was given soon collapsed. It was necessary to cut down the vein for subsequent infusions, and in the course of the procedure the formation of large thrombi was noted. When a vein that had not been used for infusion for several days was cut down, many thrombi were found to be breaking loose. It was assumed that these thrombi were lodging in the alveoli of the lungs and causing pulmonary edema.

At the time of these observations, supplies of plasma were exhausted and infusions then were

confined to saline or saline and glucose solutions. The condition of the patients improved.

Subsequently in the treatment of patients with severe burns, crushed ice was applied to the damaged areas. Shock and pain were immediately relieved and the patients had a sense of well-being. Glucose and water was given intravenously. Usually the chilling packs were kept in place for two or three days—the length of time depending upon the condition of the patient—to give opportunity for restoration of normal circulation. Use of crushed ice was cumbersome and improvisation was necessary in fitting it to the needs in each case, but there appeared to be other benefits beyond overcoming shock and relieving pain. Pulmonary edema was of lesser incidence. Loss of plasma was diminished, although not eliminated. It is probable that the absorption of dead blood cells and tissue cells was retarded and toxemia thereby reduced. Other probably tenable suppositions are that cold lowered the metabolic demands of the lesions, decreased the amount of necrosis, and tended to retard bacterial growth and secondary infection.

Aside from these factors, which in sum may be life-saving in cases of severe and extensive burns, cold may be considered as an effective method merely for relieving the pain of less serious burns. In the author's experience, the relief given by packing in crushed ice was superior to that obtained with morphine sulfate.

In any event, crushed ice packing is a method to be considered in these times when an atomic bomb attack could cause serious burns in so large a proportion of the population of an area that available physicians, using standard methods, could not cope with the problem. In such circumstances, early application of crushed ice by trained lay personnel might save lives.

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